Using Numbers to Tell 4-H Success Stories

Mary Marczak

Numbers can be a powerful tool for telling stories. *Four score and seven years ago* and *July 4th 1776* are, on the surface, simply numbers. But within their contexts these numbers stimulate intellectual and cognitive thinking about American history or holidays. For many people the numbers stir a sense of pride, excitement, and awe.

In every newspaper numbers are used to tell stories about world and local events, sports scores, weather forecasts, and business transactions. Advertisers use numbers to communicate with potential buyers.

In 4-H we gather scores of numbers for program monitoring, accountability reporting, and/or outcome and impact evaluations. A recurrent theme in 4-H is that we need to be better storytellers about both the work we do and the difference we make in the lives of youth, their families, and their communities. The numbers we gather as part of our work may add a powerful tool to our storytelling toolbox.

What Keeps Us from Using Numbers to Tell About 4-H?

We have many reasons for being cautious about using and reporting numbers to tell 4-H success stories. While this list is not by any means exhaustive, some key concerns regarding reporting numeric data are as follows:

"When youth experiences are reduced to numbers, we lose the richness of individual experiences in 4-H programs."

This may be a legitimate criticism for those relying only on one method of storytelling, whether through written dialogue or through numbers. However, it is generally agreed that multiple ways of telling a story can make our story richer and more effective (Fetterman, 1989; House, 1994). The fact that Minnesota 4-H was able to reach 263,411 youth last year (ES237, 1999) tells a story just as powerful as a testimonial from a youth who participated in a 4-H project. It is also important to remember that numbers can be used to build a rich story about individuals. For example, portfolio and case study methods allow for gathering numeric data to examine and assess individual progress and experience in programs.

"But the context gets lost in the numbers!"

This doesn't have to be true. People who work with numbers often report numbers in unfriendly and technical terms, but conditions and forces (such as program context) can give meaning to the numbers (Hedrick, 1994). Our role as storytellers is to provide the context for the numbers–what we know about the results and, given the context, what explanations we

have for the results. Being a good storyteller requires knowledge of the program's context, a broad understanding of the different forces at work, and understanding the stakeholders' perspectives (Hedrick, 1994).

"Funders, policy makers, and other stakeholders are not interested in numbers–what they want to hear are stories that pull at the heartstring!"
While this is a common argument, it often does not hold up in reality. When the story is told well, whether with numbers or written words, all methods of reporting and storytelling have been used successfully. Funders, policy makers, and key stakeholders are getting more and more sophisticated about information they use to make funding, policy, and program decisions. Most federal and local agencies are advocating for both qualitative and quantitative information. (Datta, 1994)

"We are not trained researchers, statisticians, or mathematicians. We lack the skills to tell stories using numbers."
Researchers, statisticians, and mathematicians–with their technical jargon–are often poor storytellers. To be a good storyteller, one needs to communicate information simply and efficiently so the audience can understand the information without having technical training or talent for numbers (Henry, 1997). If the numbers require sophisticated statistical analysis, then we need to work with people who have the skills to analyze and interpret the results. However, it takes someone who knows and understands the context and their stakeholders to weave the numbers into a story that is meaningful to the audience. It is also important to note that numbers that do not need sophisticated statistical analysis can be powerful tools for telling success stories.

Painting a Picture With Numbers

The quality of our work is often judged by the significance of our claim and power of our argument (Booth, et al., 1995). Thus the ability to tell the story well is essential to our work. Many agree that one of the best ways to tell a story with numbers is to do it visually through charts, graphs, and tables (Booth, et al., 1995; Henry, 1997; Henry & Dolen, 1997). Charts, graphs, and tables can dramatize or emphasize key aspects of our findings; help us organize large amounts of numbers into meaningful visual summaries; and show comparisons, patterns, and change.

Much of the following information originated from publications by individuals and organizations with diverse perspectives. *Craft of Research* is written by and for researchers and statisticians. *Creating Effective Graphs: Solutions for a Variety of Evaluation Data* (1997) includes eclectic pieces about the best ways to organize and visualize evaluation data. *Reading Charts and Tables* targets field professionals as part of their adult continuing education series. Lastly, *Descriptive Statistics: Tables, Graphs, & Charts* suggests ways to present and interpret health-related data. Interestingly, there was a great deal of convergence across these diverse perspectives about how to present and visualize numeric data.

Key steps in telling success stories with visuals:

1. Define your objective: Ask the question, "What do we want to show?" rather than "What information do we have that can be shown?" Spend some time planning what you want to accomplish with your visuals.
2. Determine whether you have the necessary information needed to meet your objective.

3. Select the most critical point you want to make (e.g., show differences, similarities, anomalies or patterns, show change over time, show complex sets of numbers in a organized fashion, etc.). Answer the question, "What kind of rhetorical and visual impact do we want the readers to feel?"
4. Choose the medium that will best make your point (charts, tables, graphs, etc.).
5. Design a simple, clear, and accurate visual that draws reader's attention to the key point.
6. Construct a story: Reiterate the point, provide context, enhance with anecdotal examples. Just before or just after the reader sees the data, state the point that you think it makes and that you want your reader to understand.

The Right Medium

When selecting the medium that will communicate your key point, it helps to know the strengths and weaknesses of each.

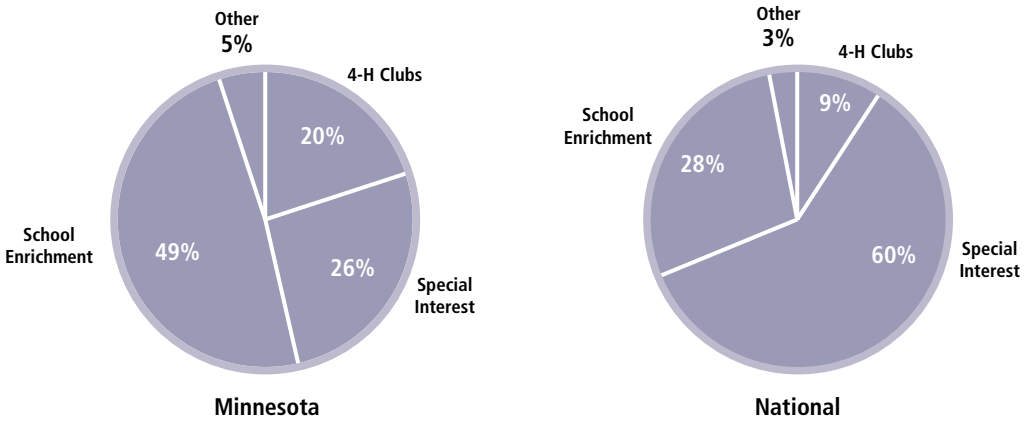
Charts Help Readers Make Comparisons

Charts tend to report fewer data and present data less precisely than graphs or tables. However, charts, especially bar charts, provide a general understanding of how several categories of information vary relative to another variable. The most commonly used charts for presenting comparative data are pie charts and bar charts.

Pie charts use wedge-shaped proportions of a circle for comparison (see Figure 1). The convention is to start at the 12 o'clock position and arrange segments in the order of their magnitude (largest first) and proceed clockwise around

Figure 1

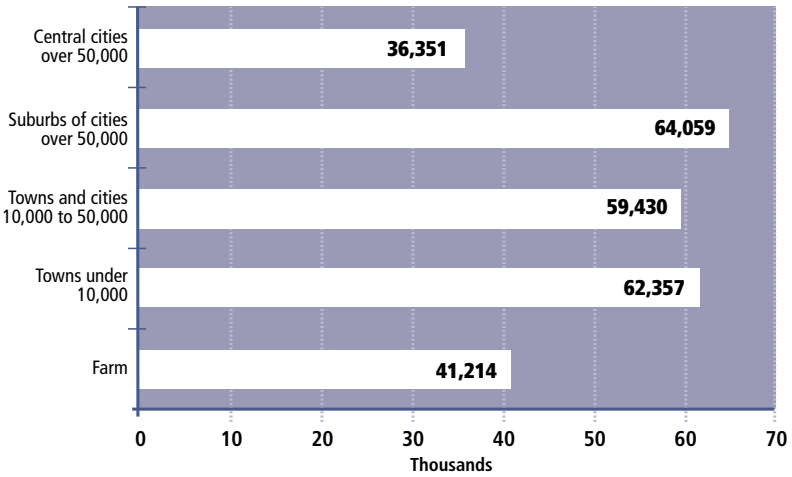
Minnesota and national 4-H youth participation by program



Sources: MN ES237 data, 1998; Annual 4-H youth Development Enrollment Report, 1998

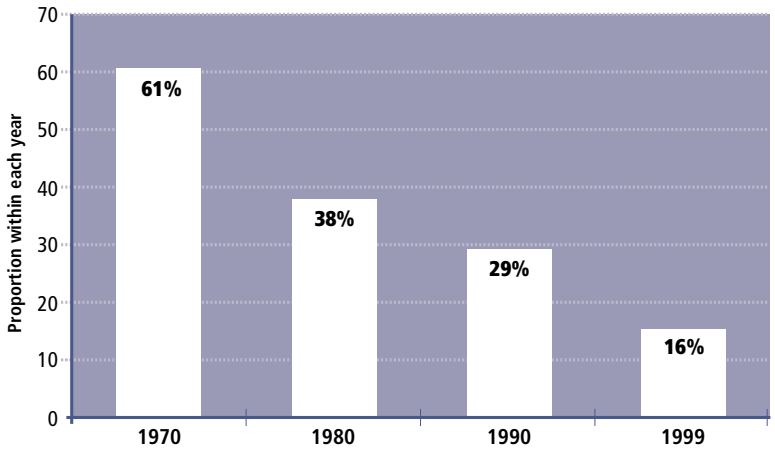
Recall that pie charts allow you to make "comparisons." In this case, comparisons can be made at multiple levels—within a single pie chart or across the two pie charts. Note that while the convention is to arrange segments in order of their magnitude, when comparing two or more pie charts, segments should be ordered in the same way for both pie charts.

Figure 2
1999 4-H Youth Membership by Residence



Source: MN ES237 Data

Figure 3
Proportion of 4-H Youth Reporting Their Residence as "Farm"



Source: MN ES237 Data

Tips for Creating Bar Charts

- Avoid three-dimensional bars. They force readers to decide whether the volume or length is more important. Columns can be shaded or colored to emphasize differences between the bars.
- Avoid charts with divided or stacked bars. They make people estimate proportions which then makes interpretation difficult. Use parallel charts, one for each category.
- Where possible, arrange the bars in ascending or descending order for ease of reading.
- Label the bars at the bottom and not in the middle of the chart itself.
- When comparisons are made, the space between bars in the same group is optional, but space between groups is mandatory.

the chart. Pie charts work best when readers need to see just a few imprecise comparisons. They are hard to read when they have more than four or five segments or when segments are thin. Bar charts use a series of bars to present comparative data. The bars may be arranged horizontally as well as vertically.

Typically, horizontal bars which are drawn to the right (Figure 2) show numeric data on the horizontal scale and the method of classification (categories) on the vertical scale. Typically, vertical bars (sometimes called column charts) show chronological data on the horizontal scale and numeric data on the vertical scale (Figure 3).

Tips for Creating Graphs

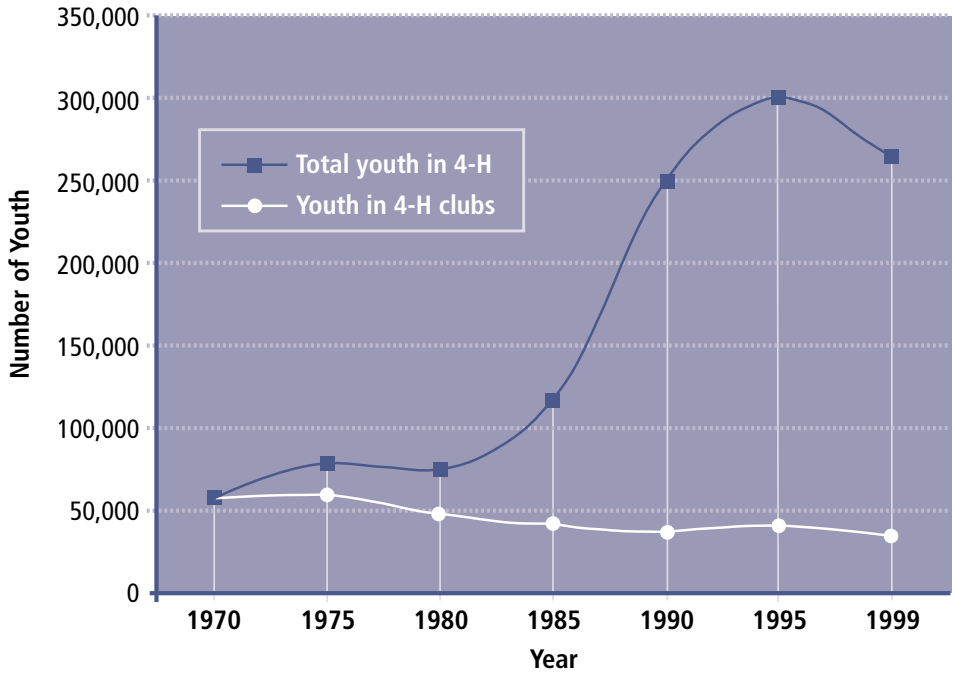
- Use as few lines as possible and make the contrast between them strong.
- Do not use more lines or symbols than the eye can easily follow–typically, readers have difficulty following more than three lines, especially when they cross.
- Graphs should be simple, and self-explanatory.
- Clearly differentiate variables with legends or keys.

Graphs Help Readers See Change

Graphs are especially effective at presenting an image of data that move continuously along a line. Graphs also allow the reader to quickly obtain an overall grasp of the data. Typically, the numeric data are usually represented on the vertical scale and method of classification on the horizontal scale. Also, chronological data should normally be on the horizontal scale (Figure 4).

Figure 4

Number of Youth Participating in 4-H Relative to the Total Number of Youth Participating in 4-H over the Past 30 Years



Source: MN ES237 Data

Remember that readers interpret graphs as a story about some change through time and that they will project the trends off the chart. Because of this, it is critical that the storyteller provides a context to make sense of the trends the graph shows. This is especially important when the lines on the graphs show sudden, sharp inclines or declines. In this graph, the storyteller should provide historical context (e.g., policy changes that occurred or changes in ES237 reporting, etc.) for the sudden increase in the total number of youth participating in MN 4-H beginning in the 80s.

Tables Help Readers Interpret Data

Tables are useful when you want to convey precise values, large amount of data, or when you do not know or do not want to say which aspects of the data will be most important to readers.

Tips for Creating Tables

- Make tables as simple as possible. Two or three small tables are preferred to a single large table.
- Three variables are the most that can be read with ease.
- Tables should be self-explanatory. Each row and each column should be labeled concisely and clearly.
- Specific units of measure for the data should be given.
- Title should be separated from the body of the table. Title should be clear, concise, and to the point. It should answer the questions: What data? Where did the data come from? When was the information collected?
- Where appropriate, totals should be shown.

Figure 5

Percent Distribution of 4-H Youth by Racial Ethnic Group

Year	Anglo European	African American	Native American	Hispanic	Asian
1999	80	9.2	2.9	3.6	4.3
1990	94	1.9	1.6	0.6	1.7
1980	91	2.4	2.3	2.7	1.1
1970	99	0.5	0.5 (other)		

Source: MN ES237 Data

More about Charts, Graphs, and Tables

Two questions should be answered before we choose the best method to tell our story.

1. What is the purpose or the point we most want to get across? Your presentation, or the story you want to tell, should be built around key information you want the readers to understand.
2. What kind of data do we have? Remember that charts invite readers to make *comparisons* while graphs invite readers to see *change* as a story. Charts and graphs are more visually striking than tables. They also tend to make key points more directly. On the other hand, tables are much more precise than charts or graphs and often appear objective and more trustworthy. Tables offer a way to organize large amounts of data and offer an option when it is best left to the readers to *interpret* the data.

The Ethics of Telling a Story Through Visuals

While there is an ethical dimension to all methods of storytelling, it is especially true with visuals. Graphics can report accurate data but visually mislead the viewer. Because it is often difficult to distinguish effective visual and rhetorical impact from unfair manipulation, we

Rules for Using Charts, Graphs, or Tables to Tell Your Story

Whether you use charts, graphs, or tables to tell your story, follow these general rules:

- **Be direct:** Design visuals so attention is drawn to the main point. Point out one idea at a time. Organize the material to make each point. Organize tables by alphabet or order of greatest to least. In charts, order the bars so that they form a coherent shape.
- **Be simple:** Limit the amount of data presented. Avoid needless detail. Keep explanations to a minimum. Use only a few fonts and avoid all upper-case letters. In charts and graphs, keep visual contrasts simple–use blacks, whites, and one or two shades of gray and avoid cross-hatching or stripes. Black and white visuals are much easier to reproduce. Most software packages create visuals that look good but do not communicate as well as they should. The software packages tend to be more interested in glitzy pictures than in visuals that tell their story effectively.
- **Be clear:** Both visually and in meaning. A visual may be physically simple yet not clear in meaning because the point is obscure. Test whether the visual tells your story by showing it to people (especially members of your intended audience) before dissemination.
- **Be accurate:** Provide an accurate impression of the data. Leave no room for ambiguity or interpretation. Use adequate and properly located labels so that readers do not misinterpret the data. Titles should include the "what, where, and when" that completely identifies the data they introduce. If the data are not original, their source should be given in a footnote.

may mislead without meaning to do so. For this reason, we need to make sure our data is presented accurately and that we are not distorting the images and data to serve our story.

Visuals can offer a powerful tool for using numbers to tell 4-H success stories. Telling the story effectively through visuals is a learned skill. We get better with practice. And the more critical we become as readers of graphs, charts, and tables, the better we can become at making our own. (Student manual: U.S. Office of Personnel Management, 1988).

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Millennium Youth Challenge Writing Contest

50 Years Ago: Today

by Ruth Neil

The following is a fictional e-mail correspondence between my granddaughter and me in 2049.

December 12

Dear Grandma,

Today my social studies teacher assigned our end-of-the-semester project. I think it will be fun–for once! We can give a speech, write a paper, or create a display on the topic: You invent a time machine and travel back 50 years to 2000. Describe your experience. Could you please e-mail me about what your life was like in 2000? I'd also love to have some examples of clothing or technology from the turn of the millennium, if you've got any. I don't have to be done with my project until January 21, but I can't wait to get started, so please hurry! Thank you!

Your Granddaughter,
Lil

Dear Lil,

I'm glad you asked for my help. Hopefully my memories will be useful to you. Although I was only 15 in 2000, I remember that time period as well as I remember what I ate for breakfast this morning. It's amazing that almost 50 years have passed and I have a 15-year-old granddaughter!

The intricacies of human DNA and the enormity of the Milky Way galaxy have been studied and explored in undreamed-of ways over the last fifty years. In the words of our fiftieth president. "The unimaginable has not only been imagined, it has been achieved." Time travel is one element of fantasy that is still and will always be fantasy. If you were able to conquer time travel, you would encounter things that have since been forgotten, like Pokemon, Ricky Martin, and suntanning salons. You would also see things that have been replaced, like VCRs, telephones, and gas stations. When you stepped out of your time machine into 2000, American culture would be foreign to you.

The economy's strength in 2000 was unprecedented. Everyone who wanted a job had one, and businesses still posted help-wanted signs. I didn't have a job off my family's farm, but many of my peers worked for minimum wage (only $5.15 back then) or better. Most Americans lived in prosperity in 2000.

However, farmers did not share in America's prosperity. I distinctly remember the December day when the November 1999 basic formula price, or BFT, of milk was announced at $9.79 per hundredweight. That price was a twenty-one-year low and only slightly more than half of what milk had been worth only a year before. The most frustrating part was that the supermarket milk

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price stayed high, and no one seemed to really care that farmer's paychecks were shrinking. My family got through the farm crisis because of the income my mom made teaching, but a lot of dairy farmers sold their cows.

For the most part, people were better off than they thought they were. The classic symptom of always having what you need was demonstrated by people believing that they needed whatever they wanted. We are lucky to have several computers in our homes today, the way some families owned several televisions or telephones in 2000. I grew up without a single computer in my home, and they were already a vital tool at that time. When I needed to use a word processor or log onto the Internet, I used the computers at the school or at the public library. Other students in my grade took their home computer for granted.

Perhaps it was the general materialism of society that prompted the big Y2K scare. People bought generators, stocked up on food and water, and emptied their bank accounts in case a computer glitch left them stranded and without electricity on January 1, 2000. However, there were no major problems due to the Y2K bug. My friends and I scoffed at the people who'd made drastic preparations. Soon, life returned to normal and everyone forgot that the new millennium had arrived (or hadn't arrived, as many people argued.)

Meanwhile, on other parts of the globe, half of the world's six billion people continued to live without electricity. All around the world, people suffered with poor sanitation, and medical care. I found it tragic that Americans, who usually had more than enough to eat and were just a phone call away from a hospital, could have been so concerned about the loss of their luxuries.

Other than the absence of Y2K hype, January 2000 proved to be pretty similar to December 1999. We enjoyed a mild winter in Minnesota that year, but an epidemic of upper-respiratory illness and flu swept the state and the country. We had flu shots fifty years ago, but they had to be administered annually, and usually only high-risk groups, like the elderly, got them. The flu, as well as colds, bronchitis, and pneumonia, were not unusual, but they were very rarely fatal. Cancer was probably the most feared disease at the turn of the millennium, yet even it was survivable.

Most people imagined that one day a medicine or a vaccine would help wipe out cancer. Instead, of course, it has been eradicated by the prevention of age. It seems we always know what will happen next and how to take care of it, whether it concerns our health, our safety, or a big social studies project due next month. I know you'll be prepared for that last one!

Love,
Grandma

Ruth Neil
Age 15